

with the phenomena of bacterial photosynthesis. He describes (together with other matters) the metabolism of the green and purple bacteria, and interprets the events taking place on the basis of a photosynthetic carbon dioxide reduction depending on the simultaneous oxidation of special hydrogen donors. The facts and interpretations of photosynthesis in both plants and bacteria are fully considered by Frank and Gaffron, who deal with the thesis that the anaerobic type of photosynthesis is the same in *all* cells, but is supplemented in green plants by the capacity of liberating gaseous oxygen.

Norman and Fuller's article on cellulose decomposition is of particular value just now when knowledge is wanted of the details of the breakdown of straw and plant residues in composts, in soil, and in the animal digestive system. These authors show that important aspects of the breakdown of cellulose can only be investigated by the use of mixed as well as of pure cultures of organisms.

Advances in knowledge of carbohydrate metabolism are reviewed by Barron (vol. 3) and by Krebs (vol. 3). Krebs considers in detail the oxidative changes undergone by substances concerned in carbohydrate breakdown in the living cell. He examines the various schemes and cycles of operations in which these substances may be involved. Barron's article deals mostly with the steps involved in carbohydrate fermentations. It indicates the vital importance of phosphorylations and of the key position taken by pyruvic acid, "the hub towards which comes fermentation, from whence starts oxidation". The importance of the phosphate bond in the changes occurring in the living cell receives due recognition in an interesting article by Lipmann (vol. 1), who describes, in the light of his concept of the energy-rich phosphate bond, many of the metabolic reactions involving phosphorylation and phosphate transfer.

One of the most important advances made recently is the demonstration by Wood and Werkman of the heterotrophic assimilation of carbon dioxide. These authors describe (vol. 2) the phenomenon in detail, and also describe the parts played by carbon dioxide in the metabolism of bacteria and animal tissues.

Advances in biochemistry necessarily involve increased knowledge of the constitution and properties of vitamins and hormones. Biotin receives attention from Hofmann (vol. 3); the elucidation of its structure by du Vigneaud and his colleagues is described, as are its occurrences in free and bound forms, and its role in animal nutrition. Biotin is a most potent growth factor; it is now receiving attention as a possible factor in the development of tumours. Another important growth factor is pantothenic acid, the structure and properties of which are described in vol. 3 by R. J. Williams, who has done so much to elucidate the properties of this vitamin. Deficiency of pantothenic acid in the diet leads to diverse pathological changes, among which are dermatitis and a depigmentation of hair. In fact, pantothenic acid is receiving increasing attention as an anti-grey hair factor. The chemistry and physiology of vitamin K—a 2-methyl-1:4-naphthoquinone derivative which is connected in some manner with enzymes involved in blood coagulation, and is sometimes referred to as an antihæmorrhagic factor—are described by Dam (vol. 2). The important adrenal cortical hormones (corticosterone, dehydrocorticosterone, and androsterone) are dealt with by Pfaffner (vol. 2).

Other articles on the structure of glycogen, the respiration of *Aspergillus*, digestion in the lower

vertebrates, and on some properties of bacteriophage, complete a valuable series of reviews, to the continuance of which all biochemists will look forward with interest.

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SOIL AND PLANT ANALYSIS

Soil and Plant Analysis

A Laboratory Manual of Methods for the Examination of Soils and the Determination of the Inorganic Constituents of Plants. By Dr. C. S. Piper. (A Monograph from the Waite Agricultural Research Institute.) Pp. xiv+368. (Adelaide: University of Adelaide, 1942.) 15s.

BOOKS on methods of analysis can be divided into two classes, one of which is the 'collected methods' type. Here each chapter or section of the book is devoted to a specific analysis or group of related analyses, and gives the working details of all or nearly all the existing methods. Such books are not only very useful and convenient but also are a necessity for those analysts to whom the original papers in the literature are not easily accessible. It is, however, the other class of book that the analyst most appreciates, namely, the book in which he is not bewildered by an array of methods but is presented with a selection recommended from considerable experience. Dr. Piper has compiled his book along these lines, and all the methods, with a very few exceptions, are those in use at the Waite Agricultural Research Institute. Concise, and more important still, precise working details are given with ample explanation and a wealth of guidance and help.

In the first section of the book, dealing with soils, the methods, both physical and chemical, are those that are useful in soil survey work and in the study of long-term factors affecting soil fertility. The very simple and rapid methods for estimating fertilizer requirements of soils have not been included, since none has been generally acceptable; and in the opinion of the author such tests are unlikely to simulate the conditions in the soil during the growth of the plant. In the second section of the book, Dr. Piper presents methods for the determination of the inorganic constituents of plants which form a logical alternative to rapid soil methods and are a more reliable approach to the availability of soil minerals, especially those supplying trace elements. Plant analysis is of supreme importance in fertilizer investigations and in studies of animal nutrition problems.

Full treatment is given to the subjects of hydrogen concentration, mechanical analysis, single-value soil constants and exchangeable ions. The methods for the determination of the sesqui-oxides, alkaline earths and alkalis contain just those essential details without which the analyst may find himself in difficulties. The chapter on wet- and dry-ashing is a valuable contribution. To those concerned with plant analysis and to many others the determination of the trace elements will perhaps appeal most of all. Here an organic reagent, dithizone, plays the leading part in the scheme of inorganic analysis. It is used with much success in separating most of the inorganic elements.

There can be no doubt that this book is an outstanding addition to those already written on this subject.